

1. Find the limits of each of the following

a. $\lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$

b. $\lim_{x \rightarrow 2} \frac{5x^3 - 20x}{2x - 4}$

c. $\lim_{x \rightarrow 2} \frac{5x^3 + 24x}{2x + 4}$

d. $\lim_{x \rightarrow 2} \frac{5x^3 + 24x}{2x - 4}$

Based on 1a, 1b, 1c, 1d answer the following questions

- e. Which of the above has a limit that can be found only using direct substitution?
- f. Which of the above is a definition of the derivative for a particular polynomial?
- g. Which of the above has no limit?
- h. Which of the above initially has indeterminate form?

2. Given $\lim_{x \rightarrow 12} f(x) = 2$, $\lim_{x \rightarrow 12} g(x) = 6$ and $\lim_{x \rightarrow 12} h(x) = 9$ use the limit properties given in this section to compute each of the following limits. If it is not possible to compute any of the limits clearly explain why not.

$$\lim_{x \rightarrow 12} \frac{f(x) - 2g(x)}{7 + h(x) f(x)}$$

3. Given $\lim_{x \rightarrow -1} f(x) = 0$, $\lim_{x \rightarrow -1} g(x) = 9$ and $\lim_{x \rightarrow -1} h(x) = -7$ use the limit properties given in this section to compute each of the following limits. If it is not possible to compute any of the limits clearly explain why not.

$$\lim_{x \rightarrow -1} \sqrt[4]{\frac{2 + g(x)}{1 - 10h(x)}}$$